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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Choon JONG

Appl. No: : Not Yet Assigned (U.S. National Phase of PCT/SG2003/000100) **PCT Branch**

Filed : Concurrently Herewith (I.A. Filed April 30, 2003)

For : APPARATUS FOR DISTRIBUTING ELECTRICAL POWER AND/OR
COMMUNICATION SIGNALS


CLAIM OF PRIORITY

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant hereby claims the right of priority granted pursuant to 35 U.S.C. 119 and 365 based upon Singapore Application Nos. SG 200202742-3, filed May 8, 2002; and SG 200300071-8, filed January 10, 2003. The International Bureau already should have sent certified copies of the Singapore applications to the United States designated office. If the certified copies have not arrived, please contact the undersigned.

Respectfully submitted,
Choon JONG


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PCT/SG 03/00100

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This is to certify that the annexed is a true copy of the following Singapore patent application as filed in this Registry.

Date of Filing : 08 MAY 2002 (08-05-2002)
Application number : 200202742-3
Applicants : NUTEK PRIVATE LIMITED
Title of Invention : ELECTRICAL POWER DISTRIBUTION
APPARATUS



Serene Chan (Miss)
Assistant Registrar
For Registrar of Patents
Singapore

09 May 2003

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INTELLECTUAL PROPERTY OFFICE OF SINGAPORE
REQUEST FOR THE GRANT OF A PATENT UNDER
SECTION 25



101101

* denotes mandatory fields

1. YOUR REFERENCE*

SP5050

2. TITLE OF
INVENTION*

ELECTRICAL POWER DISTRIBUTION APPARATUS

3. DETAILS OF APPLICANT(S)* (see note 3)

Number of applicant(s)

1

(A) Name

Nutek Private Limited

Address

39, Joo Koon Circle
Singapore 629105

State

Country

SG

☒

For corporate applicant



For individual applicant

State of incorporation

State of residency

Country of incorporation

SG

Country of residency



For others (please specify in the box provided below)

(B) Name

Address

State

Country



200202742-3

ACTION



☐ For corporate applicant

☐ For individual applicant

State of incorporation

State of residency

Country of incorporation

Country of residency

☐ For others (please specify in the box provided below)

(C) Name

Address

State

Country

☐ For corporate applicant

☐ For individual applicant

State of incorporation

State of residency

Country of incorporation

Country of residency

☐ For others (please specify in the box provided below)

☐

Further applicants are to be indicated on continuation sheet 1

4. DECLARATION OF PRIORITY (see note 5)

A. Country/country designated

DD MM YYYY

File number

Filing Date

B. Country/country designated

DD MM YYYY

File number

Filing Date

☐

Further details are to be indicated on continuation sheet 6

5. INVENTOR(S)* (see note 6)

A. The applicant(s) is/are the sole/joint inventor(s)

Yes

☐

No

☒

B. A statement on Patents Form 8 is/will be furnished

Yes

☒

No

☐

6. CLAIMING AN EARLIER FILING DATE UNDER (see note 7)

☐

section 20(3)

☐

section 26(6)

☐

section 47(4)

Patent application number

DD MM YYYY

Filing Date

Please mark with a cross in the relevant checkbox provided below
(Note: Only one checkbox may be crossed.)

☐

Proceedings under rule 27(1)(a)

DD MM YYYY

Date on which the earlier application was amended

☐

Proceedings under rule 27(1)(b)

7. SECTION 14(4)(C) REQUIREMENTS (see note 8)

Invention has been displayed at an international exhibition. Yes

☐

No

☒

8. SECTION 114 REQUIREMENTS (see note 9)

The invention relates to and/or used a micro-organism deposited for the purposes of disclosure in accordance with section 114 with a depository authority under the Budapest Treaty.

Yes

☐

No

☒

9. CHECKLIST*

(A) The application consists of the following number of sheets

i. Request

5

Sheets

ii. Description

17

Sheets

iii. Claim(s)

10

Sheets

iv. Drawing(s)

19

Sheets

v. Abstract
(Note: The figure of the drawing, if any, should accompany the abstract)

1

Sheets

Total number of sheets

52

Sheets

(B) The application as filed is accompanied by:

☐

Priority document(s)

☐

Translation of priority document(s)

☒

Statement of inventorship
& right to grant

☐

International exhibition certificate

10. DETAILS OF AGENT (see notes 10, 11 and 12)

Name

Firm

LLOYD WISE

11. ADDRESS FOR SERVICE IN SINGAPORE* (see note 10)

Block/Hse No.

Level No.

Unit No./PO Box

Street Name

P.O BOX 636

Building Name

TANJONG PAGAR POST OFFICE

Postal Code

910816

12. NAME, SIGNATURE AND DECLARATION (WHERE APPROPRIATE) OF APPLICANT OR AGENT* (see note 12)
(Note: Please cross the box below where appropriate.)

☒

I, the undersigned, do hereby declare that I have been duly authorised to act as representative, for the purposes of this application, on behalf of the applicant(s) named in paragraph 3 herein.

Name and Signature

LLOYD WISE

DD MM YYYY

08 05 2002

Our Ref: SP5050

08 MAY 2002
200202742-3

NOTES:

1. This form when completed, should be brought or sent to the Registry of Patents together with the rest of the application. Please note that the filing fee should be furnished within the period prescribed.
2. The relevant checkboxes as indicated in bold should be marked with a cross where applicable.
3. Enter the name and address of each applicant in the spaces provided in paragraph 3.
Where the applicant is an individual
 - Names of individuals should be indicated in full and the surname or family name should be underlined.
 - The address of each individual should also be furnished in the space provided.
 - The checkbox for "For individual applicant" should be marked with a cross.
 Where the applicant is a body corporate
 - Bodies corporate should be designated by their corporate name and country of incorporation and, where appropriate, the state of incorporation within that country should be entered where provided.
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 Where the applicant is a partnership
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5. The declaration of priority in paragraph 4 should state the date of the previous filing, the country in which it was made, and indicate the file number, if available. Where the application relied upon in an International Application or a regional patent application e.g. European patent application, one of the countries designated in that application [being one falling under section 17 of the Patents Act] should be identified and the country should be entered in the space provided.
6. Where the applicant or applicants is/are the sole inventor or the joint inventors, paragraph 5 should be completed by marking with a cross the 'YES' checkbox in the declaration (A) and the 'NO' checkbox in the alternative statement (B). Where this is not the case, the 'NO' checkbox in declaration (A) should be marked with a cross and a statement will be required to be filed on Patents Form 8.
7. When an application is made by virtue of section 20(3), 26(6) or 47(4), the appropriate section should be identified in paragraph 6 and the number of the earlier application or any patent granted thereon identified. Applicants proceeding under section 26(6) should identify which provision in rule 27 they are proceeding under. If the applicants are proceeding under rule 27(1)(a), they should also indicate the date on which the earlier application was amended.
8. Where the applicant wishes an earlier disclosure of the invention by him at an International Exhibition to be disregarded in accordance with section 14(4)(c), then the 'YES' checkbox at paragraph 7 should be marked with a cross. Otherwise, the 'NO' checkbox should be marked with a cross.
9. Where in disclosing the invention the application refers to one or more micro-organisms deposited with a depository authority under the Budapest Treaty, then the 'YES' checkbox at paragraph 8 should be marked with a cross. Otherwise, the 'NO' checkbox should be marked with a cross. Attention is also drawn to the Fourth Schedule of the Patents Rules.
10. Where an agent is appointed, the fields for "DETAILS OF AGENT" and "ADDRESS FOR SERVICE IN SINGAPORE" should be completed and they should be the same as those found in the corresponding Patents Form 41. In the event where no agent is appointed, the field for "ADDRESS FOR SERVICE IN SINGAPORE" should be completed, leaving the field for "DETAILS OF AGENT" blank.
11. In the event where an individual is appointed as an agent, the sub-field "Name" under "DETAILS OF AGENT" must be completed by entering the full name of the individual. The sub-field "Firm" may be left blank. In the event where a partnership/body corporate is appointed as an agent, the sub-field "Firm" under "DETAILS OF AGENT" must be completed by entering the name of the partnership/body corporate. The sub-field "Name" may be left blank.
12. Attention is drawn to sections 104 and 105 of the Patents Act, rules 90 and 105 of the Patents Rules, and the Patents (Patent Agents) Rules 2001.
13. Applicants resident in Singapore are reminded that if the Registry of Patents considers that an application contains information the publication of which might be prejudicial to the defence of Singapore or the safety of the public, it may prohibit or restrict its publication or communication. Any person resident in Singapore and wishing to apply for patent protection in other countries must first obtain permission from the Singapore Registry of Patents unless they have already applied for a patent for the same invention in Singapore. In the latter case, no application should be made overseas until at least 2 months after the application has been filed in Singapore, and unless no directions had been issued under section 33 by the Registrar or such directions have been revoked. Attention is drawn to sections 33 and 34 of the Patents Act.
14. If the space provided in the patents form is not enough, the additional information should be entered in the relevant continuation sheet. Please note that the continuation sheets need not be filed with the Registry of Patents if they are not used.

08 MAY 2002
200202742 - 3

ELECTRICAL POWER DISTRIBUTION APPARATUSBackground and Field of the Invention

G00002

- 5 This invention relates to electrical power distribution apparatus more particularly to an apparatus enabling an electrical power supply to be provided to an electrical power point.



159159

- 10 The conventional system of electrical power distribution in domestic and commercial environments is provided by power points which are installed in a wall cavity or a surface mounted power outlet at predetermined places. The location of such power points needs to be chosen in advance and often subsequent requirements can mean that the power points are provided in the wrong location and/or in insufficient numbers.

15

It is an object of the invention to provide a more flexible electrical power distribution apparatus.

Summary of the Invention

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According to the invention in a first aspect, there is provided electrical power supply distribution apparatus comprising a conduit containing at least one elongate conductor, the conduit having an opening through which a connector is able to be inserted to connect electrically with the conductor; and a

conductive member disposed between the opening and the conductor and resiliently displaceable by a said connector to provide access to the conductor.

Preferably, the member forms an earth connector and is resiliently biased towards and/or occludes and/or seals the opening and the apparatus may further comprise a displaceable flap for the opening, the member underlying the flap.

The apparatus may be combined with a said connector having an electrical contact arranged to engage the conductor.

According to the invention in a second aspect , there is provided electrical power supply distribution apparatus comprising a conduit containing at least one elongate conductor, the conduit having an opening arranged to receive a connector to connect electrically with the conductor; and a cable run separated from the conductor by an EMI shield.

The shield is preferably formed by at least a part of the conduit and may be formed from metal or as a metallic layer. The shield may form an earth connector. Preferably the cable run is arranged to receive data and/or communications cables.

According to the invention in a third aspect , there is provided an electrical connector arranged to receive an electrical plug and having first and second electrical contacts arranged to engage corresponding conductors of an

electrical power supply distribution apparatus, wherein the contacts are disposed at opposed ends of an arm rotatable between a first position in which the contacts are arranged to disengage from the conductors and a second position in which the contacts are arranged to engage with the conductors.

5

According to the invention in a fourth aspect , there is provided electrical power distribution apparatus comprising an elongate conduit containing at least one elongate conductor, the conduit having an elongate opening arranged to receive a connector to connect electrically with the conductor and a resiliently

10 displaceable flap for the opening wherein the flap is co-extruded with a part of the conduit.

Preferably the or each flap is co-extruded with a member forming a side of the opening.

15

According to the invention in a fifth aspect , there is provided a terminal connector arranged to engage a conduit containing at least one elongate conductor and having an opening arranged to receive a power point connector to connect electrically with the conductor, the terminal connector having means

20 slidably connectable to an end of a said conduit and to said conductor and arranged to connect the conductor to a mains supply or the conductor of another said conduit.

Preferably, two connectors of the fifth aspect may be combined and connected together so that said means project outwardly so as to be connectable to adjacent said conduits.

- 5 According to the invention in a sixth aspect there is provided electrical power distribution apparatus comprising: a metal conduit containing at least one elongate conductor, the conduit having an opening arranged to receive a connector to connect electrically with the conductor; and the conductor being connected to the conduit via an insulator, whereby the conduit forms an EMI
10 shield for the conductor.

According to the invention in a seventh aspect , there is provided an extension cable including the invention(s) of any of the preceding aspects.

15

Brief Description of the Drawings

The embodiments of the invention will now be described by way of examples with reference to the accompanying drawings in which:

20

Figure 1 is a three dimensional view of a track of a first embodiment of power supply apparatus of the invention;

Figure 2 is an enlarged view of a track section of the embodiment of Fig. 1
25 showing a power point connector connected to the track section;

Figure 3 is a view of the track section in direction of the arrow A of Fig. 2;

Figure 4 is an underneath three-dimensional view of the track section of Fig. 2;

5

Figure 5 is an exploded perspective view of part of the track section of Fig. 2;

Figure 6 is an underneath view of the earth spring of Fig. 5;

10 Figure 7 is a cross-sectional view similar to Fig. 3 of a track section of a second embodiment of the invention;

Figure 8 is an exploded perspective view of the power point connector shown in Fig. 2;

15

Figure 9a is an assembled view of the connector of Fig. 7 in the first position in which connector is inserted into the slot in the track section and Fig. 9b being a similar view of the connector in a second position where the connector engages electrical conductors and earth spring of the track section which are also shown.

20

Figure 10 is a part-section perspective view of the track section and power point connector, with the connector having been inserted into the track section;

Figure 11 is a view similar to Fig. 10 showing the power point connector rotated
25 to engage the electrical conductors of the track section;

Figure 12 is a perspective view of a terminal connector unit which is arranged to connect the track sections to an electricity supply;

5 Figure 13 is an exploded perspective view of the unit of Fig. 12;

Figure 14 illustrates a casing for the terminal connector unit;

Figure 15 shows the terminal connector unit engaged with the track section;

10

Figure 16 illustrates a 180 degree joint used between track sections;

Figure 17 shows a 90 degree joint;

15 Figure 18 shows a 270 degree joint; and

Figure 19 shows a communications socket cover.

Detailed Description of the Preferred Embodiments

20

With reference to Figs. 1 and 2, general views of the elements of an embodiment of the apparatus of the invention are shown. The apparatus provides a means for selecting a position in which power points may be placed thus allowing flexibility in position and/or number of power points which may be
25 provided. A track is shown in Fig. 1 and comprises a plurality of identical track

sections 100, each having a slot 110, connected together by means of joints 200 – 260 and end connectors 280, 300. Within the connectors 200 - 300 are provided power supply/connection units described hereafter which connect the track as a whole to the electrical mains supply and provide electrical continuity
5 between track sections 100. Joint 240 also provides an interface to data and/or communication cables which run through the track as will be described below. At any point along slots 110, one or more power point connector(s) 400 may be engaged with a track section 100 to provide a supply connection between the power supply connected to the track and a device to be plugged into the or
10 each connector 400.

With reference to Figs. 2 – 6 a track section 100 is shown in more detail and comprises a conduit formed from an elongate extruded plastics base 120 which includes cavities 122, 124 each for receiving an elongate cylindrical conductor
15 126, 128, each cavity 122, 124 being provided with arcuate portions for engaging the sides of each conductor 126, 128 in a snap-fit arrangement. First and second cover members 130, 132 which clip to base member 120 via formations 134, 135, 136, 138, 139, 140 are also provided. The cover members 130, 132 together with portions 142, 144 of the base member 120 form elongate
20 enclosures 146, 148 which provide cable runs. The cavities 122, 124 together meet in a central cavity 150 which has an opening forming the elongate slot 110. The cover members 130, 132 are provided with elongate deformable plastic flaps 154 which provide a cover for the slot 110.

An earth spring 160 formed from flexible, resilient conductive material is provided in the cavity 150. The earth spring 160 is connectable to earth and has a flat, elongate, sheet-like central portion 162 with wings 164, 166 projecting arcuately away from the portion 162. Each wing 164, 166 is divided into a plurality of wing members 168, 170 individually attached to the portion 162 as shown in Fig. 6. The wings 164, 166 rest in elongate slots 172, 174 which hold the ends of the wings in position. The surface 162 projects outwardly to cover slot 110 just below flaps 154. The cavities 122, 124 further have projecting edges 176, 178 which engage the sides of wings 164, 166 and provide further support for the earth spring 160. The earth spring 160 is locally resiliently displaceable from the position shown in Fig. 2 to a position in which the central portion 162 is depressed downwardly to, in the limit, abut against a projection 152 of the base 120. In this position, the ends of the wings 164, 166 remain in the elongate slots 172, 174. The earth spring 160 in this position allows access to the electrical conductors 126, 128 by the power point connector 400.

Each portion 142, 144 is provided with a plurality of openings 143 to allow fixing of the track section 100 to a supporting surface. The base further includes elongate channels 180, 182 for receiving connector lugs as will be described hereinafter.

The base 120 and covers 130, 132 are formed from extruded plastic materials, for example PVC or PP (Poly-propylene). The flaps 154 are co-extruded with the covers 130, 132 and are formed from the same material but of lower

hardness. The cylindrical conductors 126, 128 are preferably formed from copper with the earth spring 160 being formed from a conductive spring material, preferably an alloy such as beryllium copper or phosphorous bronze.

5 A second, preferred embodiment of track section is shown in Fig. 7. This is generally similar to that described with reference to Figs. 1 – 6 and similar parts have similar reference numerals with the addition of 1000. The essential difference between this embodiment and that of the previous figures concerns the base member 1180 which instead of being extruded from plastics material is
10 extruded from metal, preferably aluminium. Each conductor 1126, 1128 is disposed in a cavity 1182, 1184 slightly differently shaped compared to the first embodiment via an elongate insulating member 1186, 1188. The insulating members 1186, 1188 are extruded from PVC or PP and are a snap-fit in the cavities 1182, 1184, held in place by co-operating formations ringed at 1190
15 and 1192. Insulating member 1188 is shown snapped in place in cavity 1184 with member 1186 removed from the cavity 1182. The insulating members 1186, 1188 have opposed jaws which hold the conductors 1126, 1128 in place. In use, the metal extrusion forming the base 1180 and the cavities 1192, 1194 provides an EMI shield between the conductors 1126, 1128 and the data and
20 telecommunications cable runs 1146 and 1148. The EMI shield is further enhanced by the wings 1164, 1166 of the earth spring 1160 which contact the metal base member 1180 at points 1194, 1196 to form a conductive loop around the conductor. The base member 1180 is preferably connected to earth as well as or instead of the earth spring 1160, so that the combination of
25 earth spring and base provides earth protection.

In a further embodiment, a plastic extrusion provided with a metal conductive film may be used instead of a metal extrusion. In a further alternative, a plastic extrusion of a first embodiment may be used with a conductive paint or film
5 covering the internal surfaces of the or each cable run 146, 148.

The power point connector 400 shown in Fig. 2 will now be described with more details with reference to Fig. 8 and 9. The connector includes a cover 410 with openings 412, 414, 416 of a standard UK type three pin plug arrangement,
10 although this, and the supporting mechanism, could be changed to any suitable plug/socket system. The cover 410 and a base 418 together form a housing. The base 418 has a generally circular opening 419 formed therein. A flange member 420 rests in the opening 419 held axially in place against the rim of the opening 419 by snap-fit connector 421 but rotatable relative to the rim. The
15 flange member 420 has itself a circular opening 422 and is provided with radially inwardly extending contact protection members 424, 426 best shown in Fig. 9.

An electrical contact mounting member 430 is snapped on in opening 422. The
20 member 430 has a cylindrical bearing portion 432 connected to a larger cylindrical flange 434. The bearing portion 432 rests in opening 422 with the flange 434 being supported by the edge of the opening. Connected to the bearing portion 432 is a contact arm 441 which is provided with contact holders 436, 438 at each end. The contact arm 441 is further provided with a raised
25 section 435 extending only part of the length of the arm, offset relative to the

axis of rotation of the arm. As shown in Fig. 3, the cavities 122, 124 are each provided with an inwardly projecting surface 156, 158 of a different length. The surfaces 156, 158 and projection 435 co-operate to allow only rotation of the arm 441 in one direction and not the other to ensure that a desired polarity of connection between the contact arm 441 and the conductors 126, 128 is maintained.

Each electrical contact holder 436, 438 is of a hook form, the tail of the hook being connected to the remainder of the arm 441 and the head being spaced from but resiliently displaceable towards the remainder of the arm. The length of the arm is such that when contact is made with the conductors 126, 128 there is a slide interference fit, so that the contact portions 436, 438 deform to give a pressing electrical contact.

The flange 434 provides a platform for a contact engaging formation 440 which holds live and neutral contacts 442, 444 in place. Each contact 442, 444 includes a pair of opposed arms 446, 448 which are arranged to receive a pin of a mains plug in sliding engagement when inserted through respective openings 414, 416. Arms 446 are connected via a series of angular elements to contacts 450, 452 which engage around the outside of the contacts supporting portions 436, 438 as is best illustrated in Fig. 9b.

Earth connection 454 protrudes out of flange 434 and freely makes electrical contact with earth spring 160 once the power point connector 400 is pushed through slot 154. In the embodiment of Fig. 7, the earth spring provides a

bridge between the earth connection 454 and the aluminium base member 1180 which provides a further earth shield.

A shutter member 460 for closing off socket openings 414, 416 is provided.

5 The shutter member 460 occludes the sockets 414, 416, overlying the arms 446, 448 of the electrical contacts 442, 444. The shutter member 460 has a spindle 462 which is received within a spring 464 which is in turn mounted between four orthogonal posts 466 of the mounting formation 440. The shutter member 460 has slanting engagement surfaces 468, 470 which when a mains
10 plug is inserted through sockets 414, 416 will cause shutter member 470 to rotate and be depressed away from the path of movement of the plug pins allowing the plug pins to engage with arms 446, 448 to make an electrical connection.

15 When assembled, the arm 441 projects through opening 422 and is rotatable between the position shown in Fig. 9a in which the contacts 450, 452 are covered by protection members 424, 426, and it is in this position that the connector 400 is inserted through slot 152 of track section 100, and the position shown in Fig. 9b after 90 degree clockwise rotation in which the contact
20 member is at right angles to the protection members 424, 426. It is in this position that the contacts 450, 452 engage with the conductors 126, 128, with the protection members 424, 426 remaining in the slot 110 and locally depressing the earth spring 160.

Operation of the embodiment of the invention will now be described with reference to Figs. 10 and 11 which are part section views, in Fig. 10, of the power point connector 400 when initially inserted into the track section 100 and, in Fig. 11, subsequently rotated clockwise, electrically to engage the conductors of the track section 100. It is to be understood that the location at which the connector 400 engages the track is chosen by the user in accordance with requirements. Once this location is chosen, the connector is placed in a position shown in Fig. 9a with the protection members 424, 426 aligned with slot 110. The connector 400 is then pushed through the cover 154 against the bias of the earth spring 160, pressing this down at the point of entry of the connector 400. The bias of the spring provides a resistance to entry and gives a feeling of positive location of the connectors in the slot to the user. Since the earth spring 160 is formed from flexible material, the spring resiliently deforms only at the point of entry of the connector 400 and remains in a position to cover slot 110 elsewhere. When fully depressed, the cover 410 is then rotated through 90 degrees. The cover, being connected to the rotatable member 430 also causes the arm 434 to rotate through 90 degrees so that this moves from a position in line with slot 152 to a position in which the arm 434 sweeps into cavities 122, 124 until the contacts 450, 452 engage conductors 126, 128 in sliding engagement to provide an electrical path between the conductors 126, 128 and the arms 446, 448. The direction of rotation is dependent on which way the connector is inserted into the slot, since the offset projection 435 will strike surface 158 if the connector is turned the wrong way. Only when turned the right way will the projection 153 not strike the projecting surface 158, thus only allowing connection of the contacts to the correct conductors. Flange member

420 remains in place during this rotation with contact protection members 424, 426 being held in the channel. The engagement of the arm 446, 448 with conductors 126, 128 and the sides of the adjacent cavities lock the power point connector 400 in place at the chosen location. The connector 400 may then be
5 used by any normal electrical power point.

A power supply/connection unit 500 housed within joints 200 – 260 and then connectors 280, 300 is illustrated in Figs. 12 and 13. The unit 500 comprising a housing 506 having a cover 510. The housing 506 is provided with openings
10 530 through which run respective cables which connect respective live and neutral contacts of adjacent units 500, as is described below, and a larger opening 540 for receiving a mains cable to supply power to the unit. Cable catches 520 hold the mains cable and constituent cables in place in the housing 500. Live and neutral connectors 550 are each provided with three terminals
15 560 for cable connection and two projecting contacts 570 having a bulbous end 575 which are arranged to engage both sides of the electrical conductors 126, 128 of the track section 100. The housing 500 is provided with projections 580 each having a slot 585 which continues through to the inside of housing 500 so that the contacts 570 may be inserted through the wall of housing 500 with the
20 terminals 560 lying inside the housing 500 and the contacts 570 lying in slots 585 with the bulbous ends 575 projecting from the slots. Earth connector 590 has similar terminals 592 and a three arm earth contact 594. Of the three arms, the outer two arms have the same undulating form with the middle arm being of straight form the combination being such that earth spring engagement surfaces
25 of the arms slightly overlap to hold the earth spring tightly between them. An

opening 596 is provided in housing 500 through which the contacts 595 project. Below the contacts is provided a first lug 598 having an opening 600 which slots around projection 152 of the track section 100. The contact 594 rests on a surface 602 of the lug 598. A further lug 604 projects above the lug 598 and engages the cavity 150. The opposed surfaces of lug 598 and projection 604 have bevelled or slanted surfaces 606, 608 to guide the earth spring 160 into engagement with the earth contact 594.

Further lugs 610, 612 are provided to engage in cavities 180, 182 of the track section to provide further support.

A slot 610 is provided on each side of the housing 500 the use of which will now be described with reference to Fig. 14 which illustrates a housing of the end connector 280. The housing comprises a base 620 and a cover 624 closed at one end to form a neat end closure. The base 620 includes a mains cable opening 626 and two resiliently displaceable catch members 628. A tray for receiving the unit 500 is formed by the base 620 and raised perimeter sides 630, 632, 634. Two raised lugs 636 are mounted on walls 630, 634 and overhand walls 630, 634, projecting into the tray 629. Mounting openings 640 are provided in the base 200 on either side of the tray 629.

20

In use, a terminal unit 500 is mounted on a base 620 by placing the unit 500 in the tray 629 and sliding this forward so that slots 610 engage lugs 636 and until the unit 500 passes over displaceable catch member 628 which spring up to lock the unit 500 in place against wall 632.

25

The unit 500 and base 620 are then engaged with the track section 100 as shown in Fig. 15 in a sliding fit. In Fig. 15, the conductors 126, 128 and earth spring 160 base been artificially extrapolated beyond the end of the track section 100 (these components would not normally protrude) and shown in
5 phantoms lines to illustrate the manner of engagement.

The housing of a 180 degree joint 260 is shown in more detail in Fig. 16 and comprises a cover 650 and base 660 which is a similar construction to base 620 of the end connector 280 of Fig. 14 except that the base 660 has the elements
10 of the base 620 as well as a mirror image so that two terminal units 500 may be connected back to back. A larger central opening 665 for receiving mains cabling is provided so that each terminal 500 can feed the track section to which it is connected separately. Alternatively, the terminal units 500 may be connected one to each other through openings 530 to provide electrical
15 continuity. A 90 degree housing for a 90 degree joint 200 and for a 270 degree joint 220 are shown in Figs. 17 and 18. These are similar to the joint 260 except for the relative angles of the trays for receiving the units 500 and will not be described further.

20 As mentioned, the cable runs 146, 148 of track section 100 are adapted for data and/or communication cables. Such cables are fed through the cable runs 146, 148 and also through portions of the connector/joint housings on each side of the trays which receive the units 500. The cables may enter and exit the track through opening(s) 665. In order to allow user access to the
25 data/communication cables, a 180 degree joint base as shown in Fig. 16 is

used but with a different cover 700 as shown in Fig. 19, which is provided with openings 710, 720 for network connector or telecommunications cable sockets.

The described embodiment may be particularly used as a fixed power
5 distribution apparatus, with the combination of track sections and connectors as
shown in Figure 1 being connected to a suitable supporting surface, such as a
wall or movable partition or furniture item. However, the described embodiment
may also be used in a movable manner, for example as an extension cable,
with a single track section being provided with two end connectors, one end
10 connector being connected to a cable having a suitable plug at its free end, in
the manner of a normal extension cable. One or more power point connectors
may then be attached to the track section according to need.

CLAIMS

1. Electrical power supply distribution apparatus comprising:
a conduit containing at least one elongate conductor, the conduit having an
5 opening through which a connector is able to be inserted to connect
electrically with the conductor; and
a conductive member disposed between the opening and the conductor and
resiliently displaceable by a said connector to provide access to the
conductor.

10

2. Apparatus as claimed in claim 1 wherein the member forms an earth
connector.

15

3. Apparatus as claimed in claim 1 or claim 2 wherein the member is resiliently
biased towards the opening.

4. Apparatus as claimed in any one of claims 1 to 3 wherein the member
occludes the opening.

20

5. Apparatus as claimed in any one of claims 1 to 4 wherein the member seals
the opening.

6. Apparatus as claims in claim 4 or claim 5 further comprising a displaceable
flap for the opening, the member underlying the flap.

25

7. Apparatus as claimed in any one of the preceding claims wherein the opening is an elongate slot.

5 8. Apparatus as claimed in any one of the preceding claims wherein the member has a sheet-like surface and a support portion engaging the conduit.

10 9. Apparatus as claimed in claim 8 further comprising two opposed support portions.

10. Apparatus as claimed in claim 8 or claim 9 wherein the or each portion is of winged form.

15 11. Apparatus as claimed in claim 10 wherein the or each wing comprises a plurality of individual wing portions separately connected to the surface.

20 12. In combination apparatus as claimed in any one of the preceding claims and a said connector have an electrical contact arranged to engage the conductor.

13. A combination as claimed in claim 12 wherein the apparatus comprises first and second conductors and the connector comprises first and second electrical contacts arranged to engage respective said conductors.

14. A combination as claimed in claim 13 wherein the contacts are disposed at opposed ends of an arm rotatable between a first position in which the contacts are disengaged from the conductors and the second position in which the contacts are engaged with the conductors.

5

15. Electrical power supply distribution apparatus comprising:

a conduit containing at least one elongate conductor, the conduit having an opening arranged to receive a connector to connect electrically with the conductor; and

10 a cable run separated from the conductor by an EMI shield.

16. Apparatus as claimed in claim 15 wherein the shield is formed by at least a part of the conduit.

15 17. Apparatus as claimed in claim 15 or claim 16 wherein the shield is formed from metal.

18. Apparatus as claimed in claim 15 or claim 26 wherein the shield is formed as a metallic layer.

20

19. Apparatus as claimed in claim 12 wherein the conductor is insulated from said part.

20. Apparatus as claimed in claim 19 further comprising an elongate insulator
25 disposed between the conductor and said part.

21. Apparatus as claimed in any one of claims 15 to 20 wherein the shield forms an earth connector.

5 22. Apparatus as claimed in any one of claims 15 to 21 further comprising a conductive member disposed between the opening and the conductor and resiliently displaceable to provide access to the conductor.

10 23. Apparatus as claimed in claim 22 wherein the conductive member forms part of the shield.

24. Apparatus as claimed in claim 23 wherein the conductive member and conduit together form a conductive loop around the conductor.

15 25. Apparatus as claimed in any one of claims 15 to 24 wherein the cable run is enclosed.

26. Apparatus as claimed in claim 25 wherein the cable run is formed parallel to the conductor as a separate conduit.

20

27. Apparatus as claimed in any one of claims 15 to 26 wherein the cable run is arranged to receive data and/or communications cables.

28. Apparatus as claimed in claim 27 further comprising a cover, the cover having at least one opening arranged to receive a data and/or communications connector.

5 29. An electrical connector arranged to receive an electrical plug and having first and second electrical contacts arranged to engage corresponding conductors of an electrical power supply distribution apparatus, wherein the contacts are disposed at opposed ends of an arm rotatable between a first position in which the contacts are arranged to disengage from the
10 conductors and a second position in which the contacts are arranged to engage with the conductors.

30. A connector as claimed in claim 29 wherein the ends of the arm are resiliently displaceable.

15

31. A connector as claimed in claim 30 wherein each end is of hooked form.

32. A connector as claimed in any one of claims 29 to 31 further comprising means arranged to allow engagement of each contact only with a selected
20 conductor.

33. A connector as claimed in claim 32 wherein the means comprises a formation offset relative to the axis of rotation of the arm.

34. In combination, a connector as claimed in any one of claims 29 to 33 and a
said electrical power supply distribution apparatus comprising a conduit
containing at least one elongate conductor, the conduit having an opening
through which the connector is able to be inserted to connect electrically
5 with the conductor.

35. A combination as claimed in claim 34 further comprising a conductive
member disposed between the opening and the conductor and resiliently
displaceable by a said connector to provide access to the conductor.

10

36. In combination a connector as claimed in claim 32 or claim 33 and a said
electrical power distribution apparatus comprising a conduit containing two
elongate conductors, the conduit having an opening through which the arm
of the connector is able to be inserted, and means arranged to allow
15 engagement of each conductor only with a selected contact of the arm.

37. A combination as claimed in claim 36 wherein said means comprises first
and second formations offset relative to said opening.

20

38. A connector as claimed in any one of claims 29 to 31 further comprising
arm protection means arranged to protect the arm in the first position.

25

39. A connector as claimed in claim 38 wherein the protection means
comprises first and second formations, the arm, in the said first position,
lying between the formations.

40. Electrical power distribution apparatus comprising an elongate conduit containing at least one elongate conductor, the conduit having an elongate opening arranged to receive a connector to connect electrically with the conductor and a resiliently displaceable flap for the opening wherein the flap is co-extruded with a part of the conduit.

41. Apparatus as claimed in claim 40 further comprising a second flap for the opening.

42. Apparatus as claimed in claim 40 or claim 41 wherein the or each flap is co-extruded with a member forming a side of the opening.

43. Apparatus as claimed in claim 42 wherein the or each member forms a cover for the conduit.

44. Apparatus as claimed in any one of claims 40 to 43 wherein the flap and part are co-extruded from the same material but of different hardness.

45. A terminal connector arranged to engage a conduit containing at least one elongate conductor and having an opening arranged to receive a power point connector to connect electrically with the conductor, the terminal connector having means slidably connectable to an end of a said conduit and to said conductor and arranged to connect the conductor to a mains supply or the conductor of another said conduit.

46. A connector as claimed in claim 45 wherein said means comprises at least one contact arranged slidably to engage with an end of a said conductor.

5 47. A connector as claimed in claim 46 comprising two said contacts arranged to engage opposed sides of a said conductor.

48. A conductor as claimed in claim 46 or claim 47 wherein the contact is arranged to engage a cylindrical conductor.

10

49. A connector as claimed in claim 46 comprising three said contacts arranged to engage two opposed sides of the conductor.

15

50. A connector as claimed in claim 48 wherein the contacts are arranged to engage a sheet-like conductor.

51. A connector as claimed in any one of claims 45 to 50 wherein said means comprises at least one projection arranged to be slidably receivable in a corresponding socket of a said conduit.

20

52. A connector as claimed in claim 51 as dependent directly or indirectly upon claim 46 wherein the projection partially surrounds the contact.

53. In combination, two connectors as claimed in any one of claims 45 to 52 connected together so that said means project outwardly so as to be connectable to adjacent said conduits.

5 54. A combination as claimed in claim 53 wherein the connectors are connected via a base member.

55. A combination as claimed in claim 53 or claim 54 wherein the connectors are electrically connected together.

10

56. Electrical power distribution apparatus comprising: a metal conduit containing at least one elongate conductor, the conduit having an opening arranged to receive a connector to connect electrically with the conductor; and the conductor being connected to the conduit via an insulator, whereby
15 the conduit forms an EMI shield for the conductor.

57. Apparatus as claimed in claim 56 further comprising a conductive member disposed between the opening and the conductor and resiliently displaceable to provide access to the conductor.

20

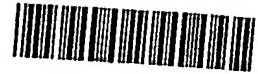
58. Apparatus as claimed in claim 57 wherein the member forms part of the shield.

59. Apparatus as claimed in claim 58 wherein the member and conduit together form a conductive loop around the conductor.

25

60. Apparatus as claimed in any one of claims 56 to 59 further comprising a cable run separated from the conductor by the shield.

61. An extension cable including apparatus as claimed in any of claims 1 to 11,
5 15 to 26, 38 to 42 and 56 to 60, a combination as claimed in any of claims 1 to 14 and 32 to 35 and/or a connector as claimed in any of claims 27 to 31, 36, 37 and 43 to 50.



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ABSTRACT

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ELECTRICAL POWER DISTRIBUTION APPARATUS

5

An electrical power distribution apparatus is disclosed which includes a track made up of a plurality of track sections 100 connected together by/to joints and end sections. The track sections are each provided with a slot 110 with which a power point connector 400 may be engaged at any point by inserting a contact member of the connector 400 through the slot 110 at a chosen point and then rotating the connector 400 by 90 degrees to bring the contact member into engagement with electrical conductors 126, 128 of the track.

10

15 **FIG. 11**

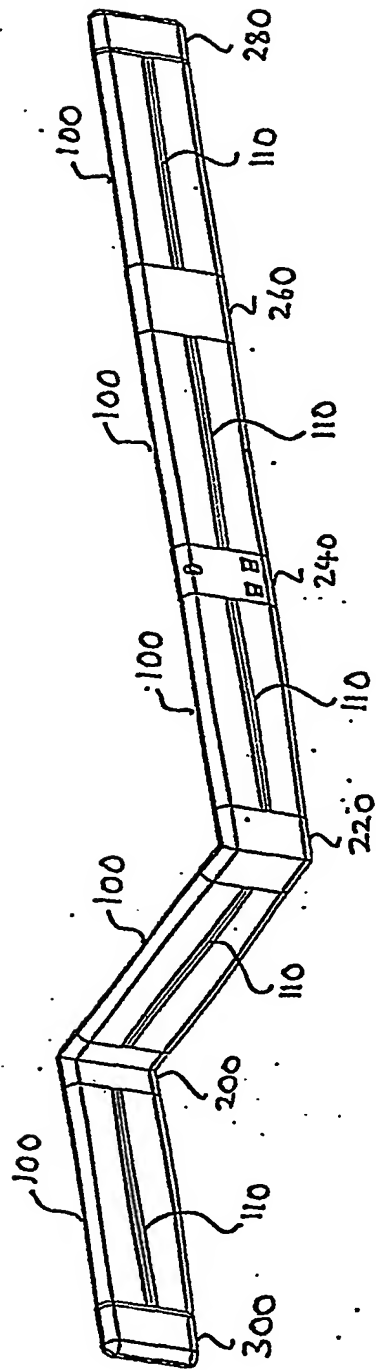


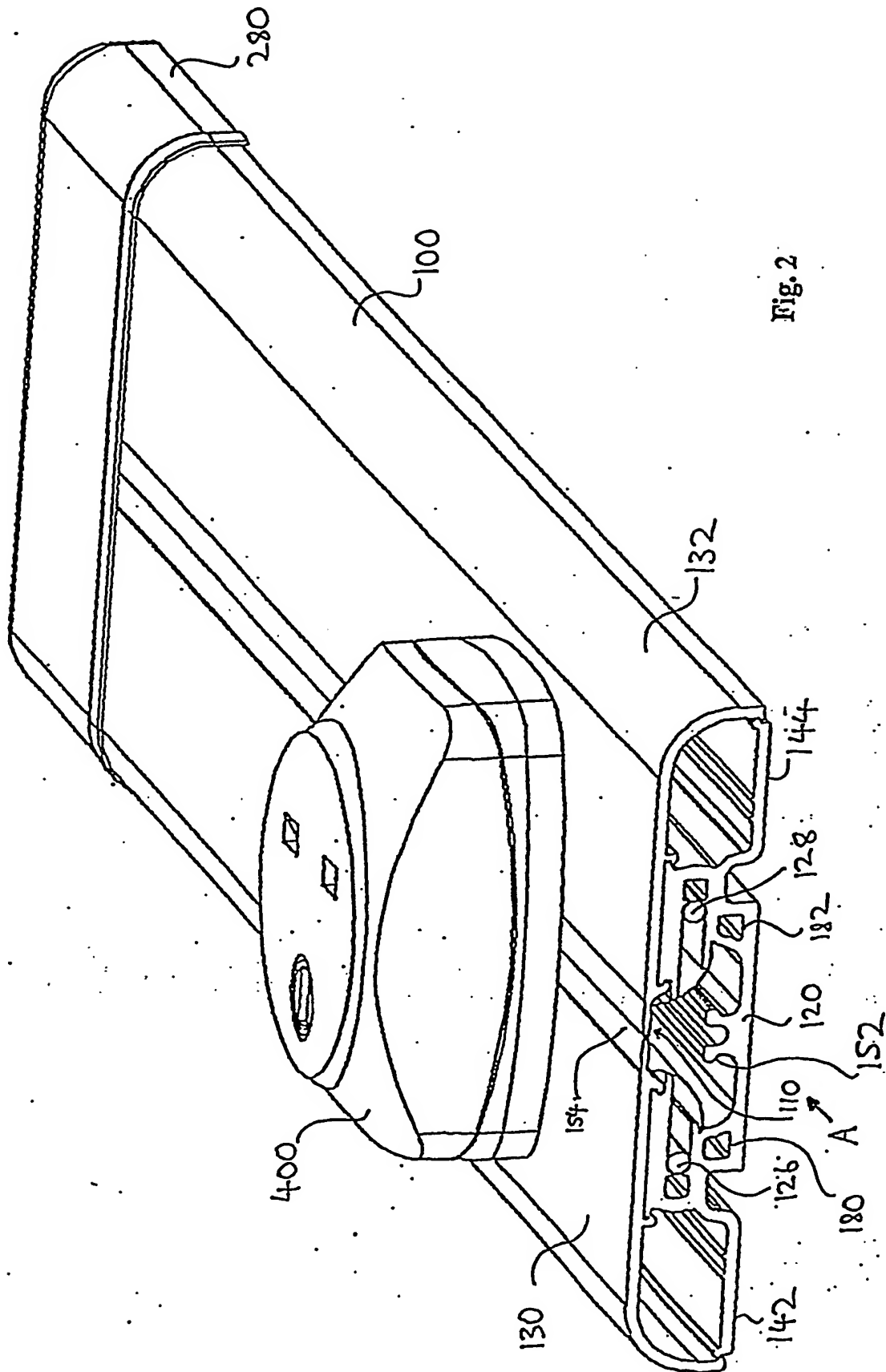
Fig. 1



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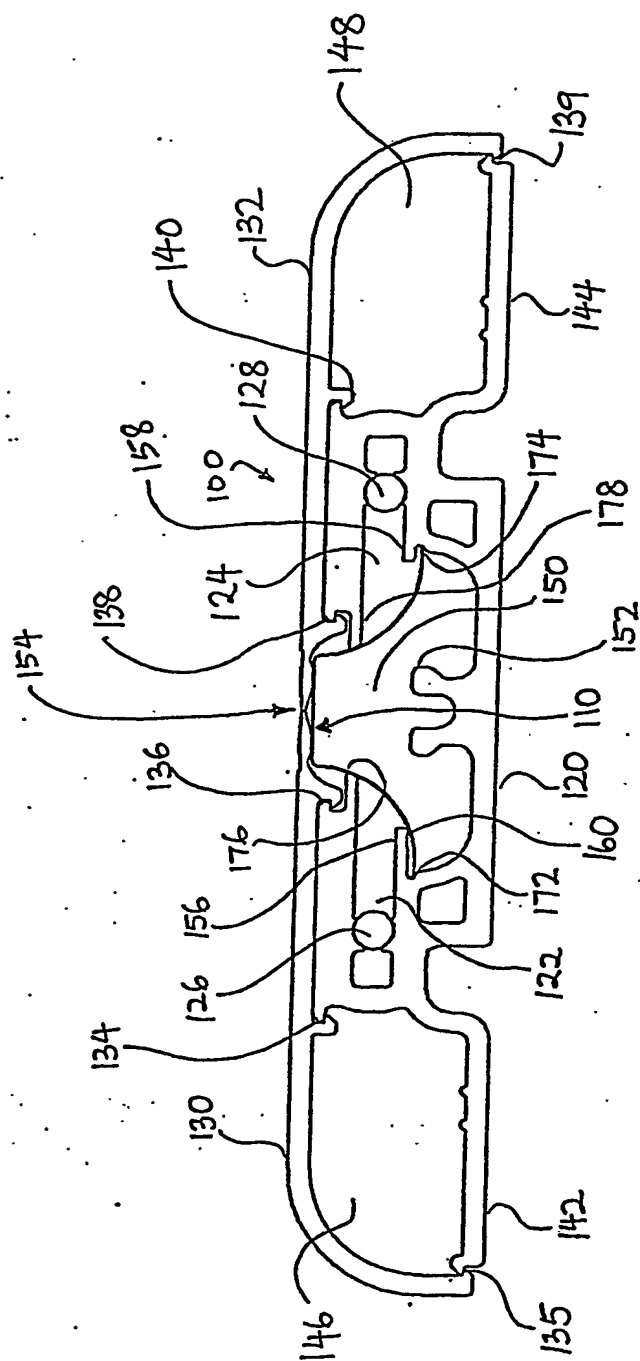


Fig. 3

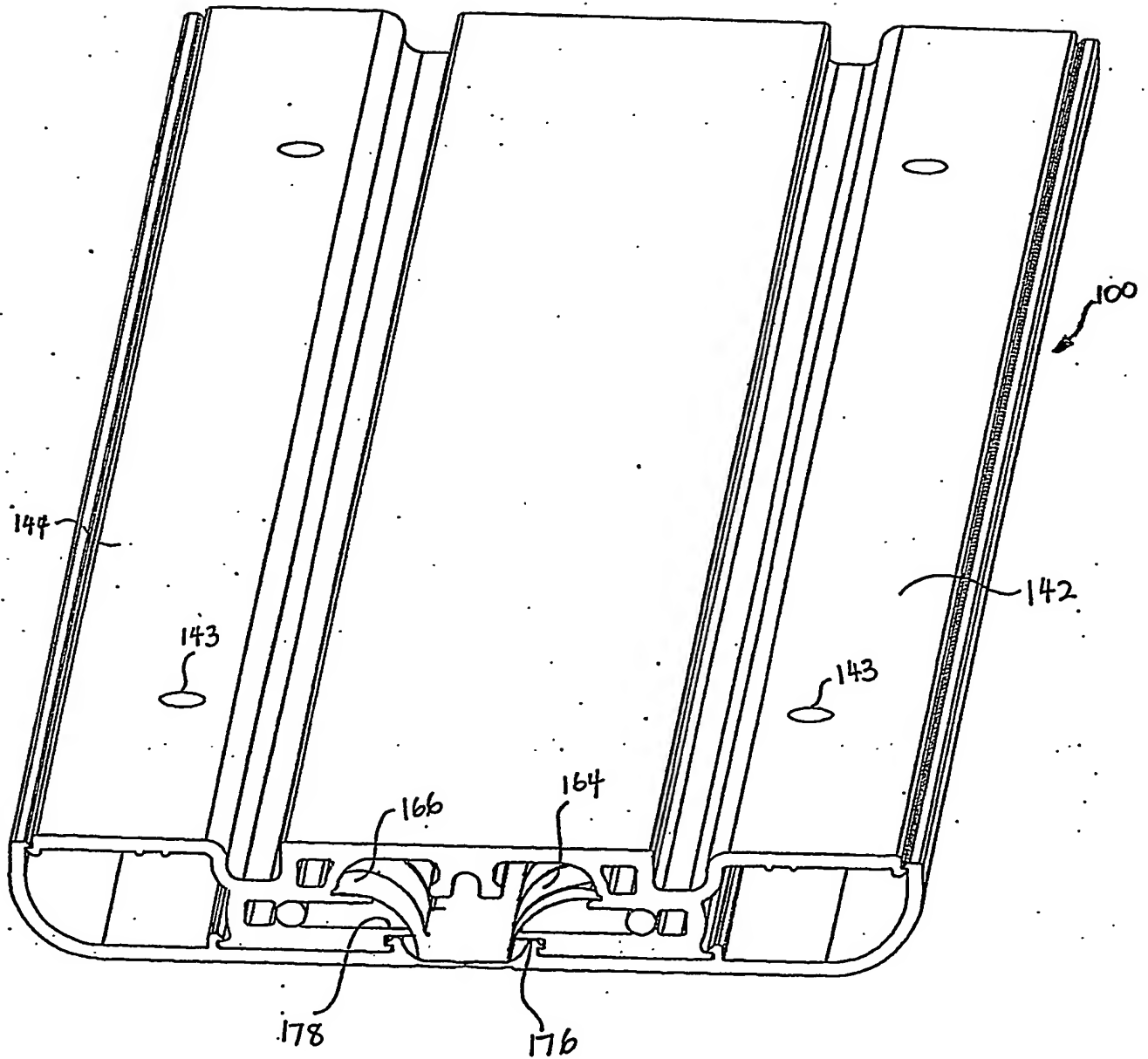


Fig. 4

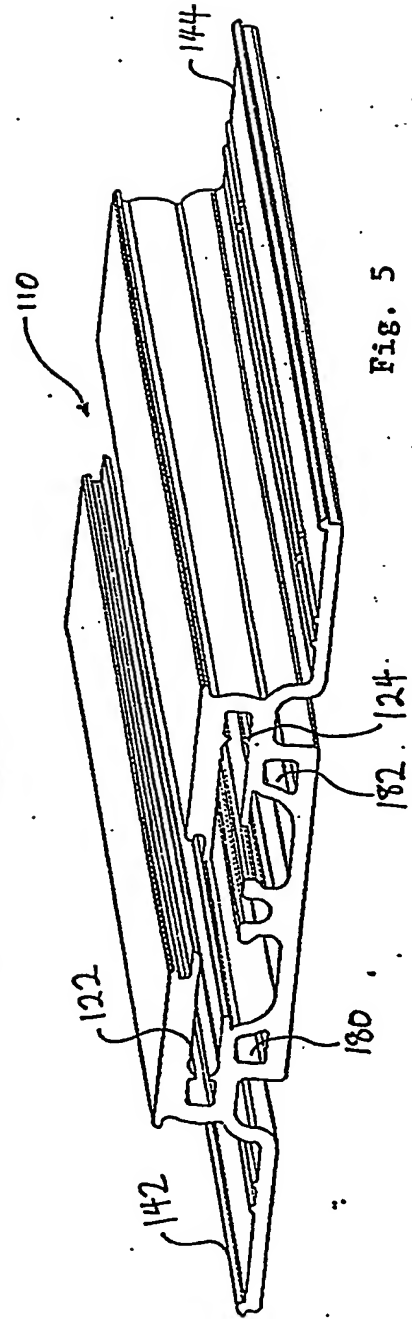
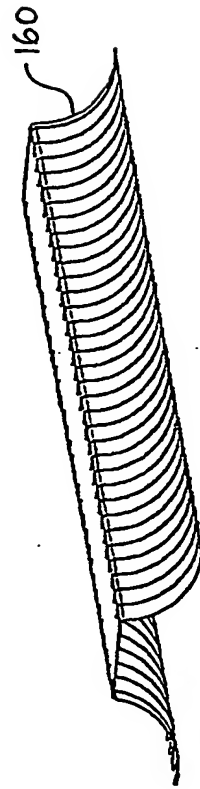
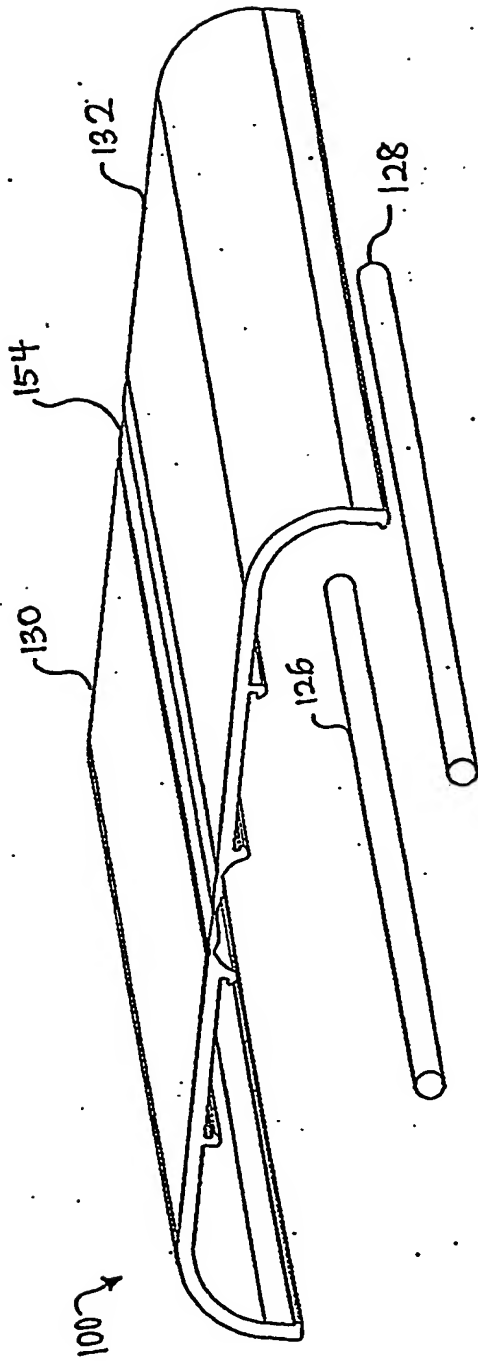


Fig. 5

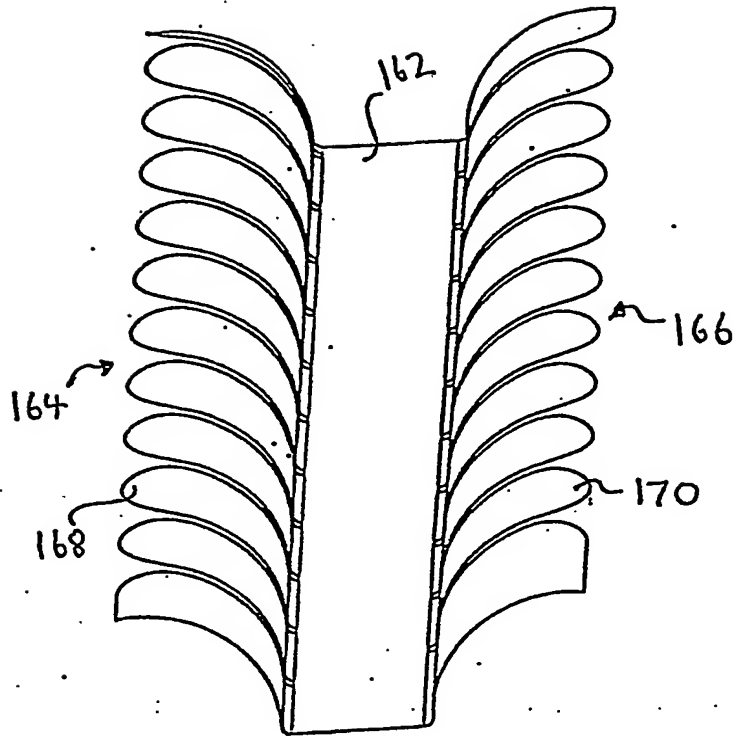


Fig. 6

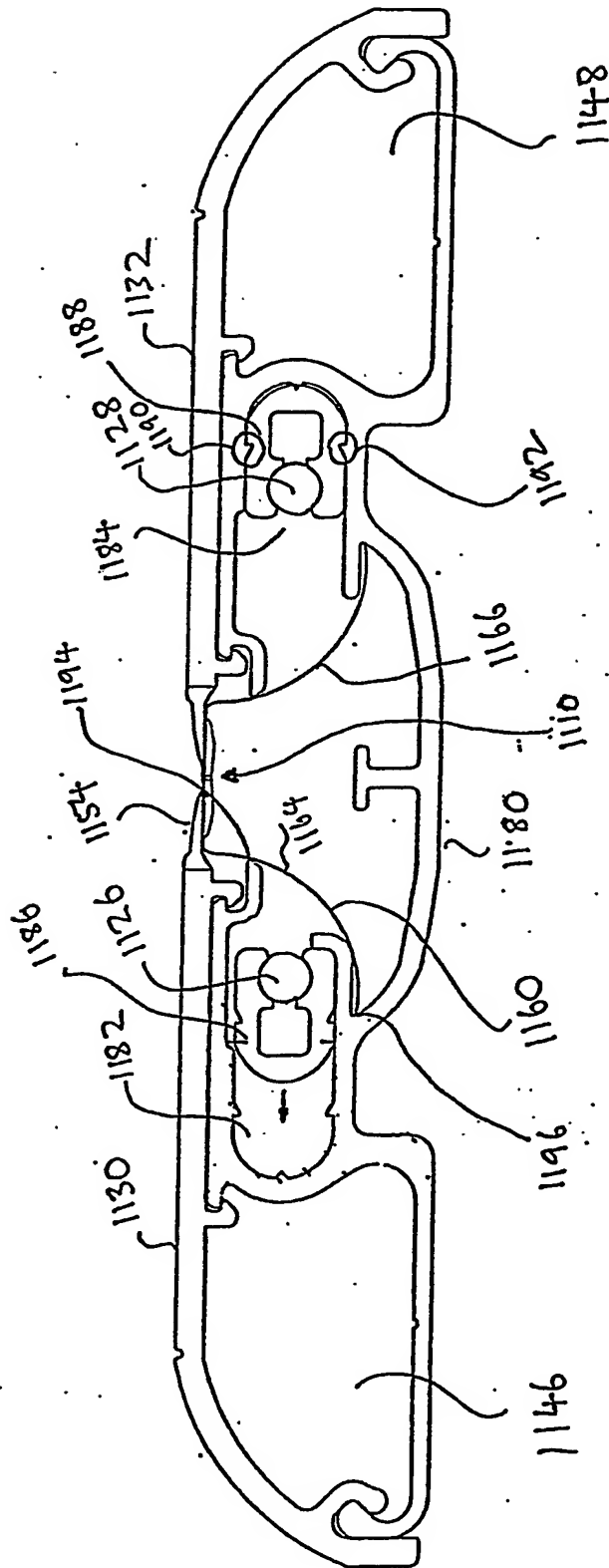


Fig. 7

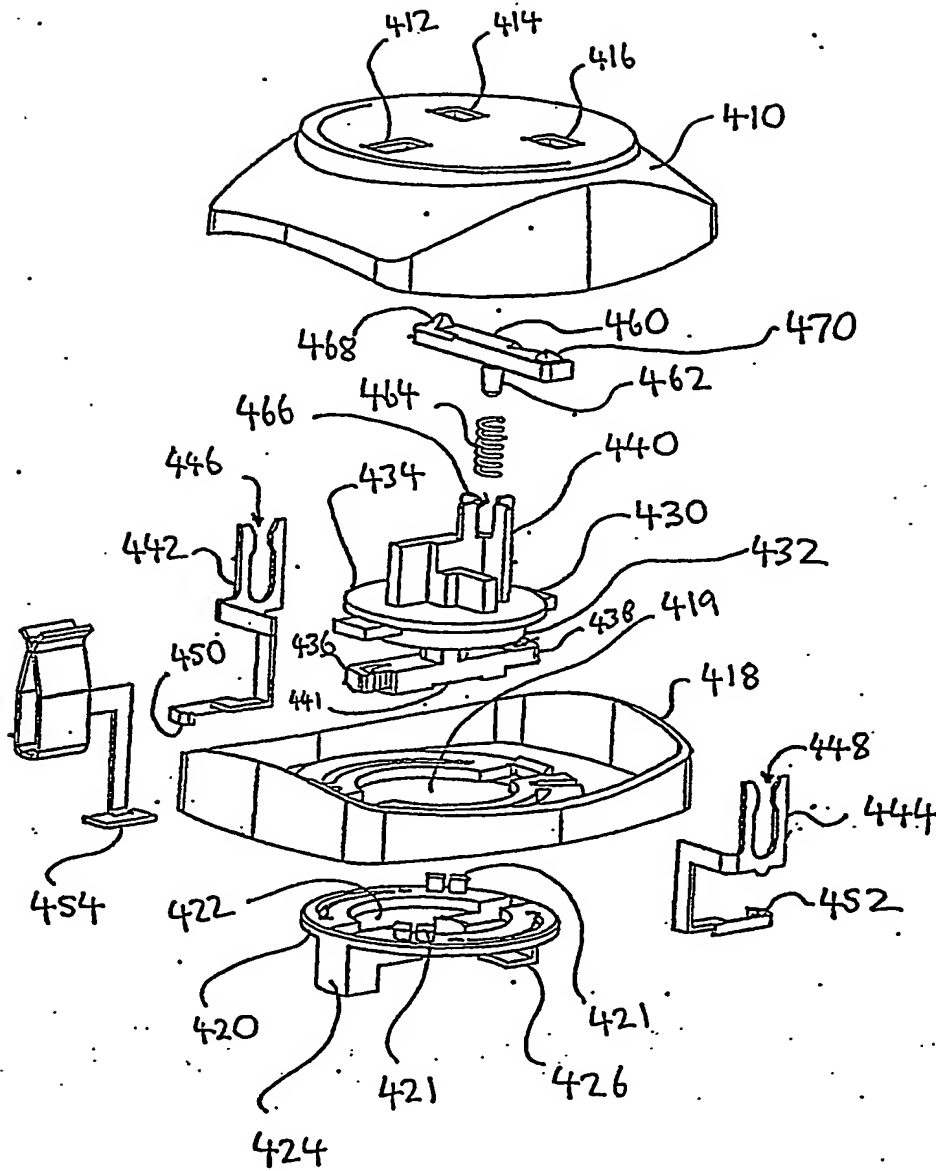


Fig. 8

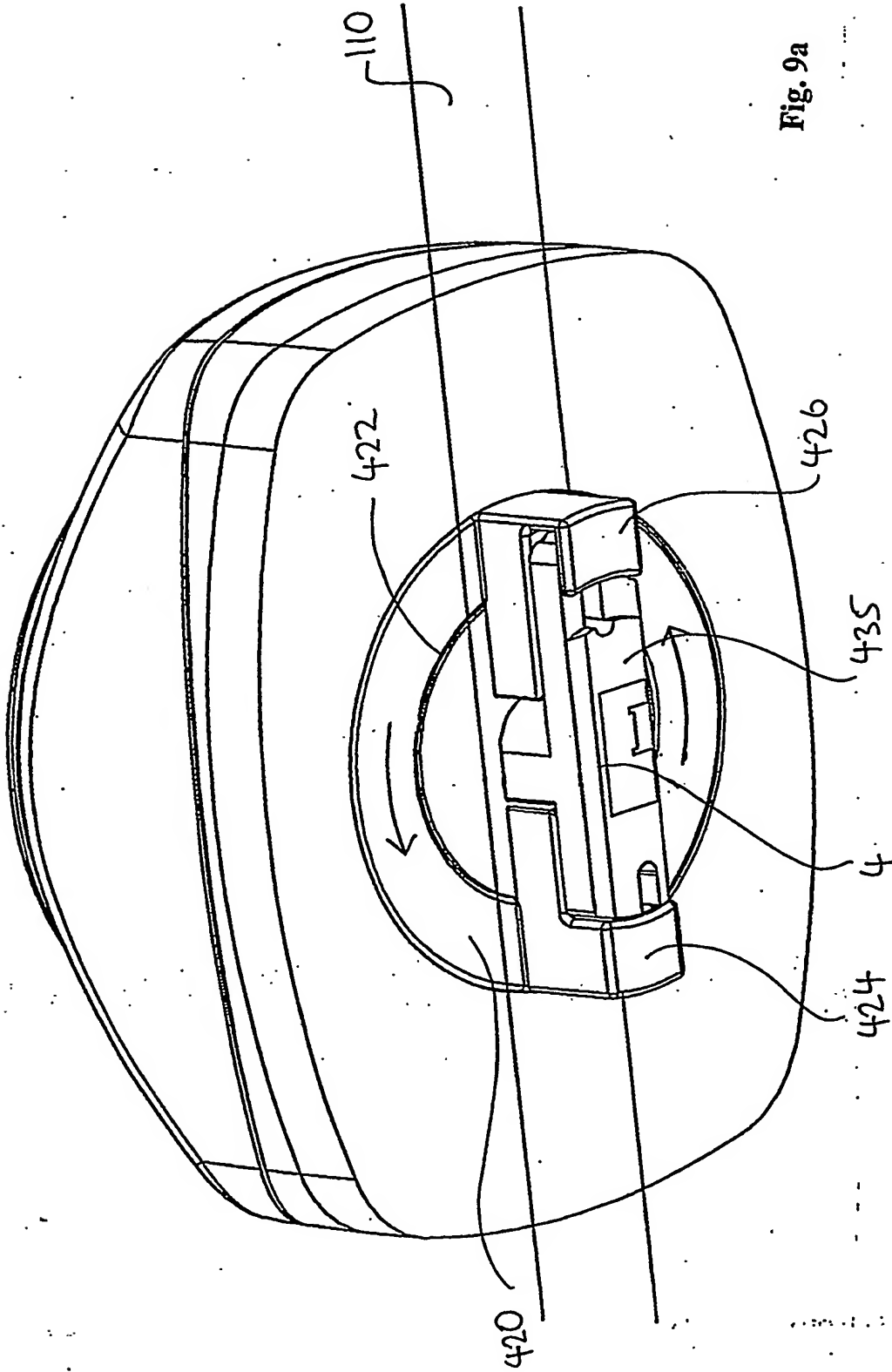
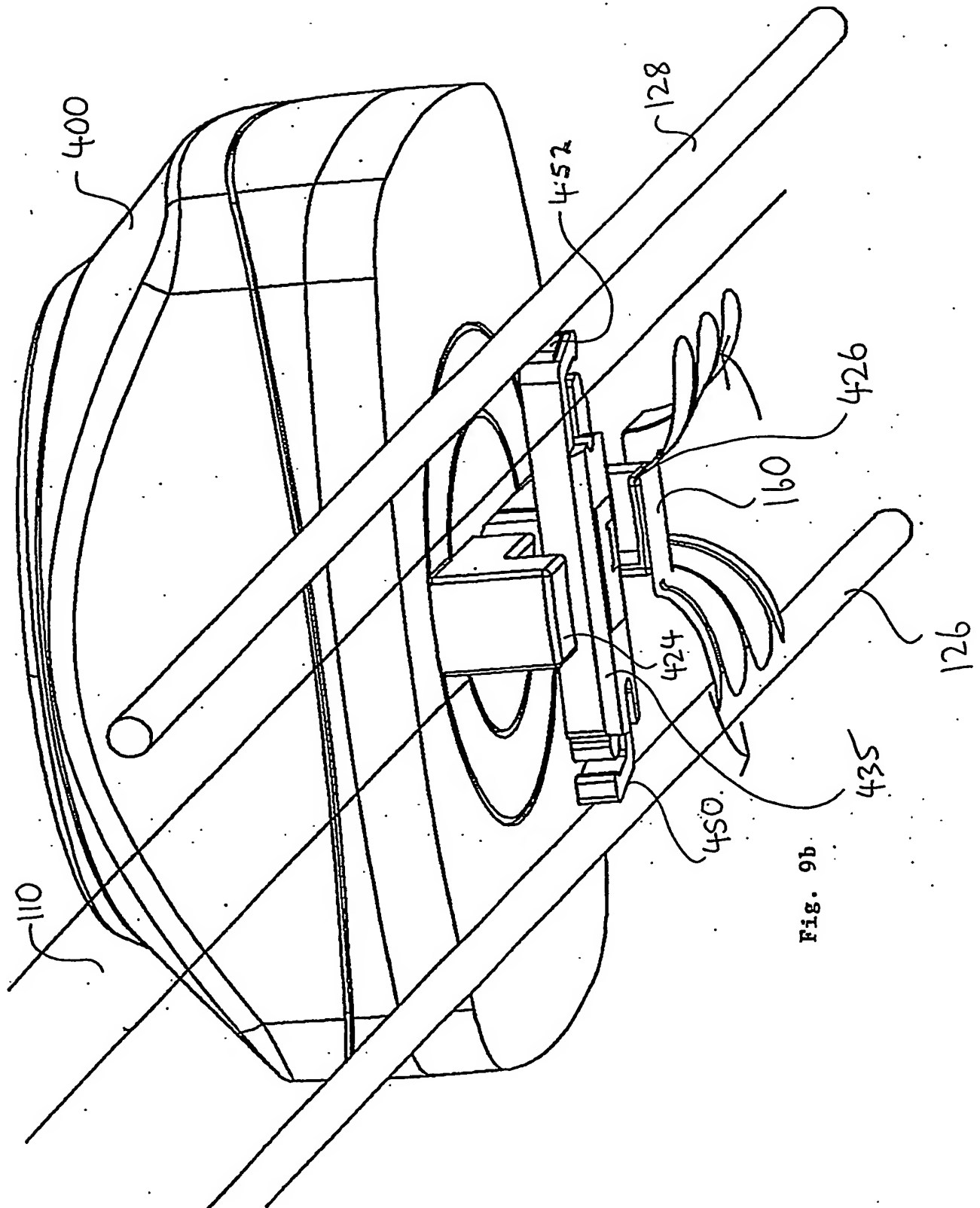


Fig. 9a



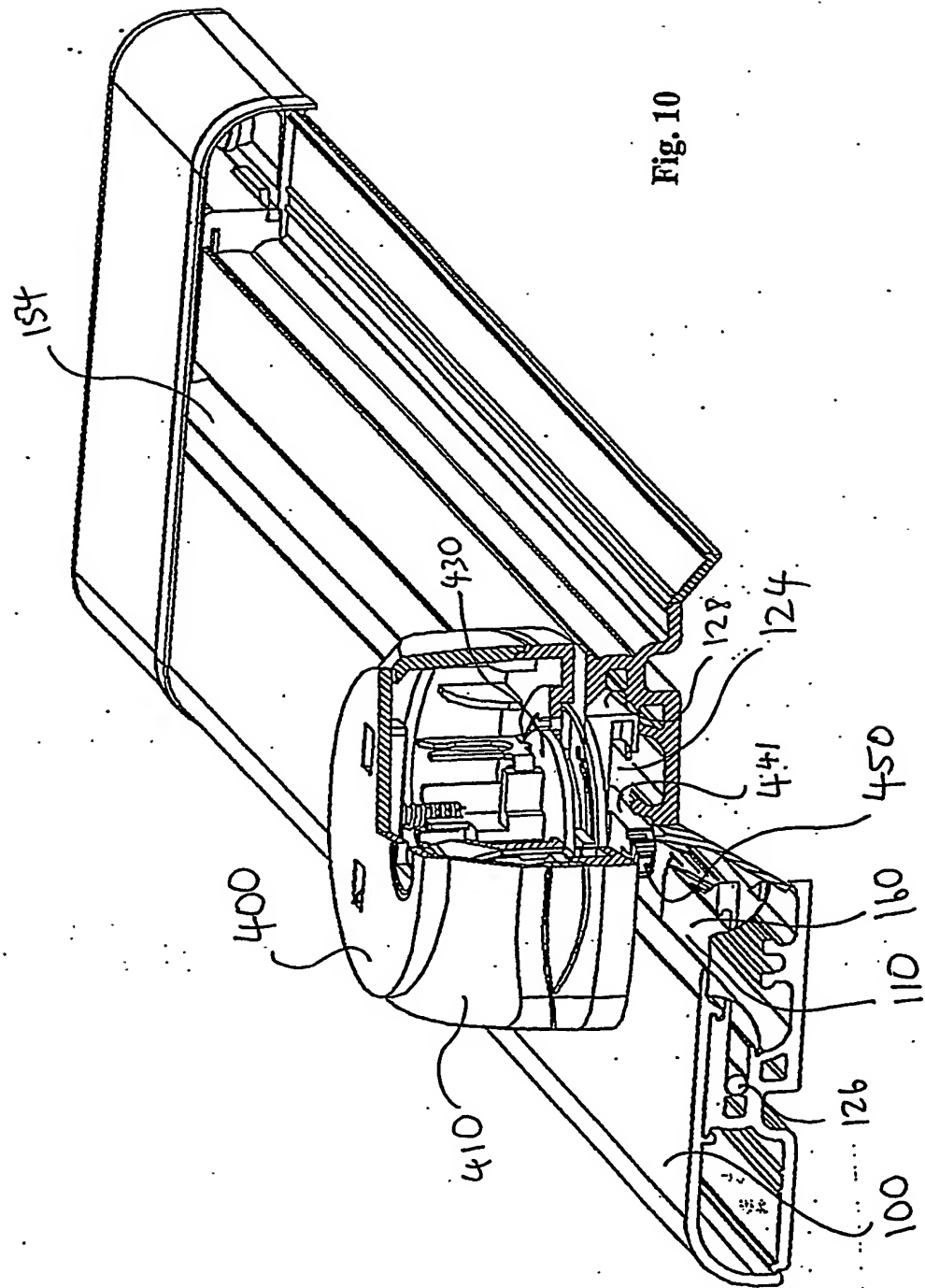
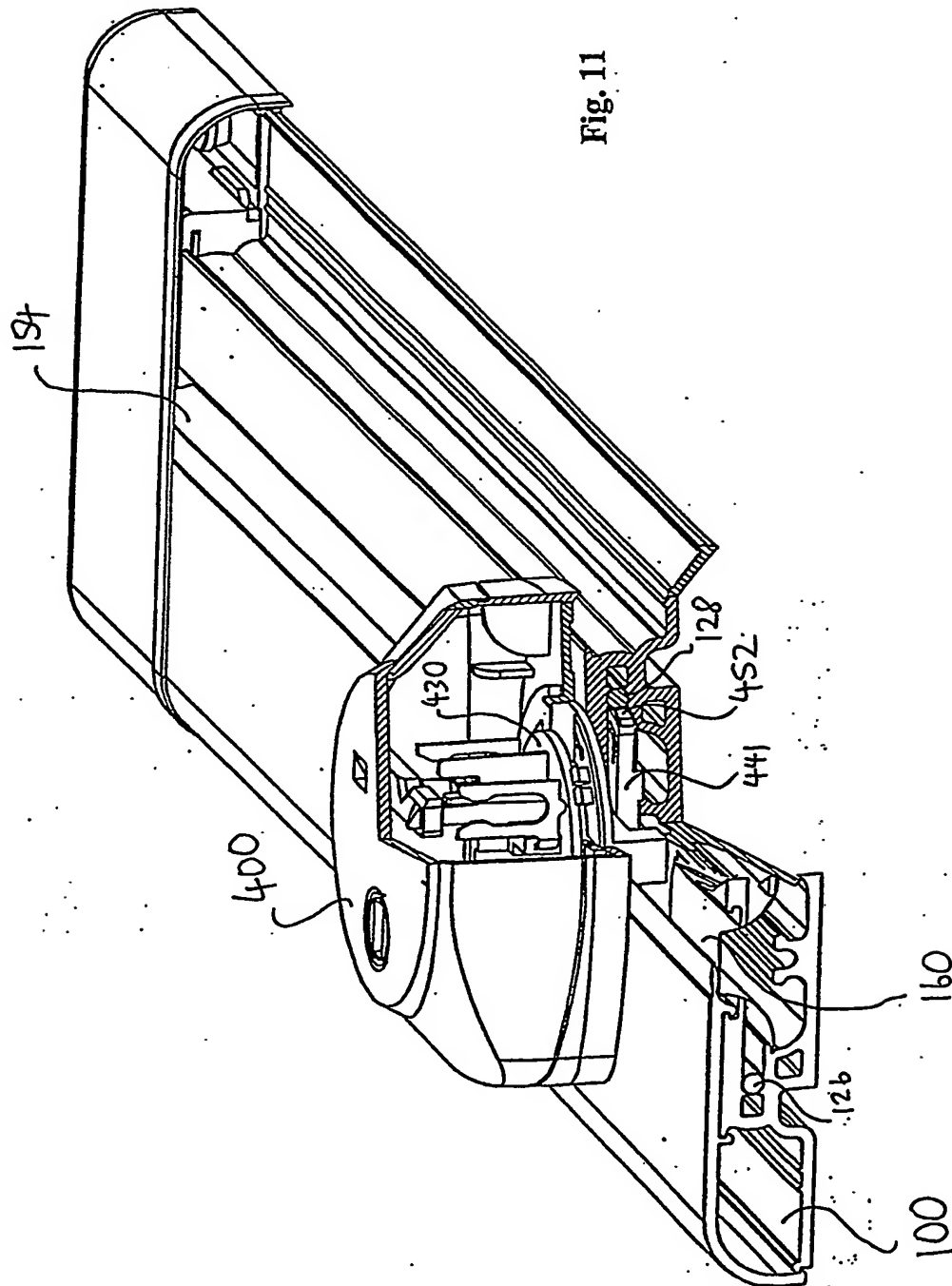


Fig. 10

Fig. 11



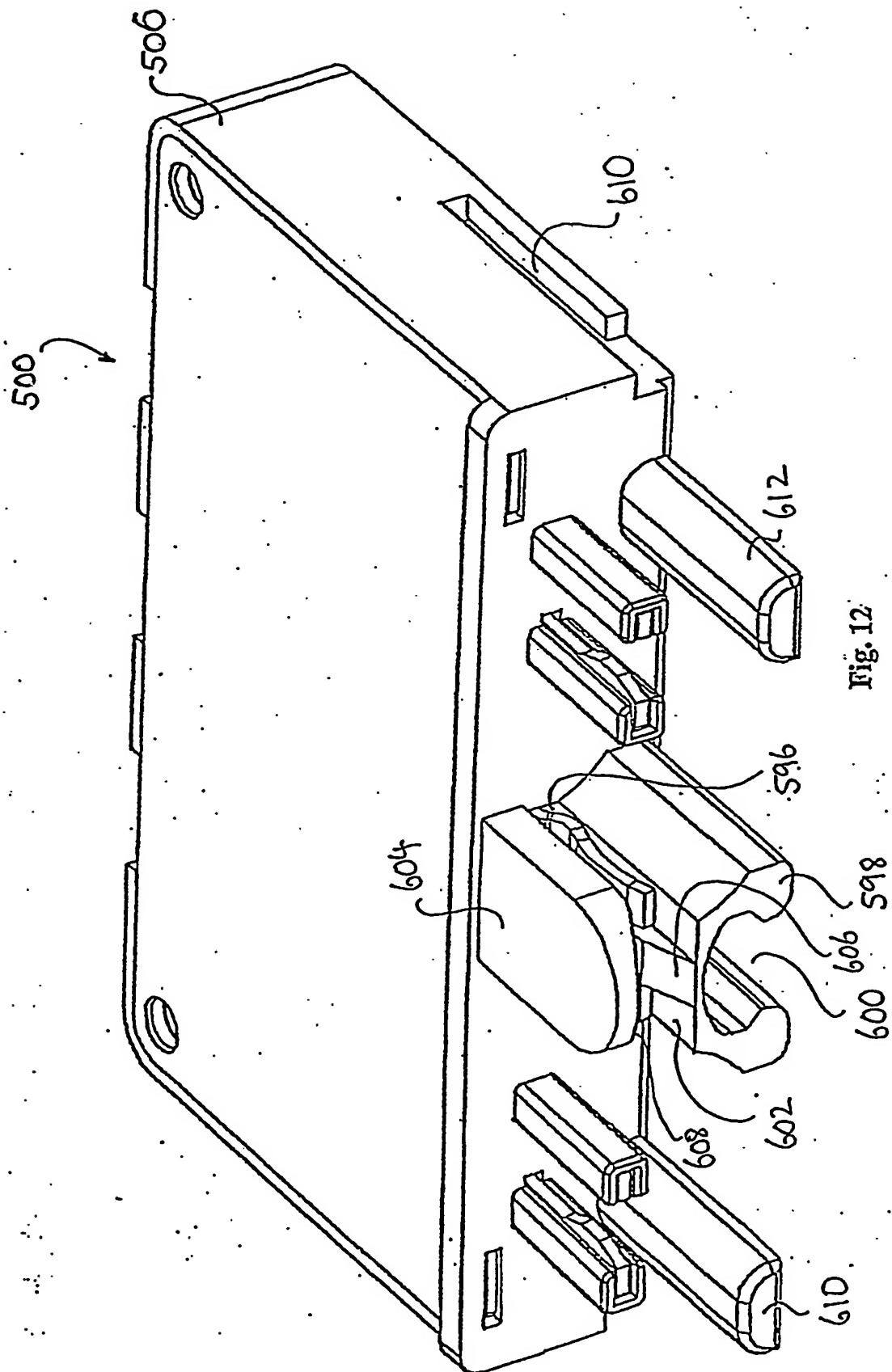


Fig. 12

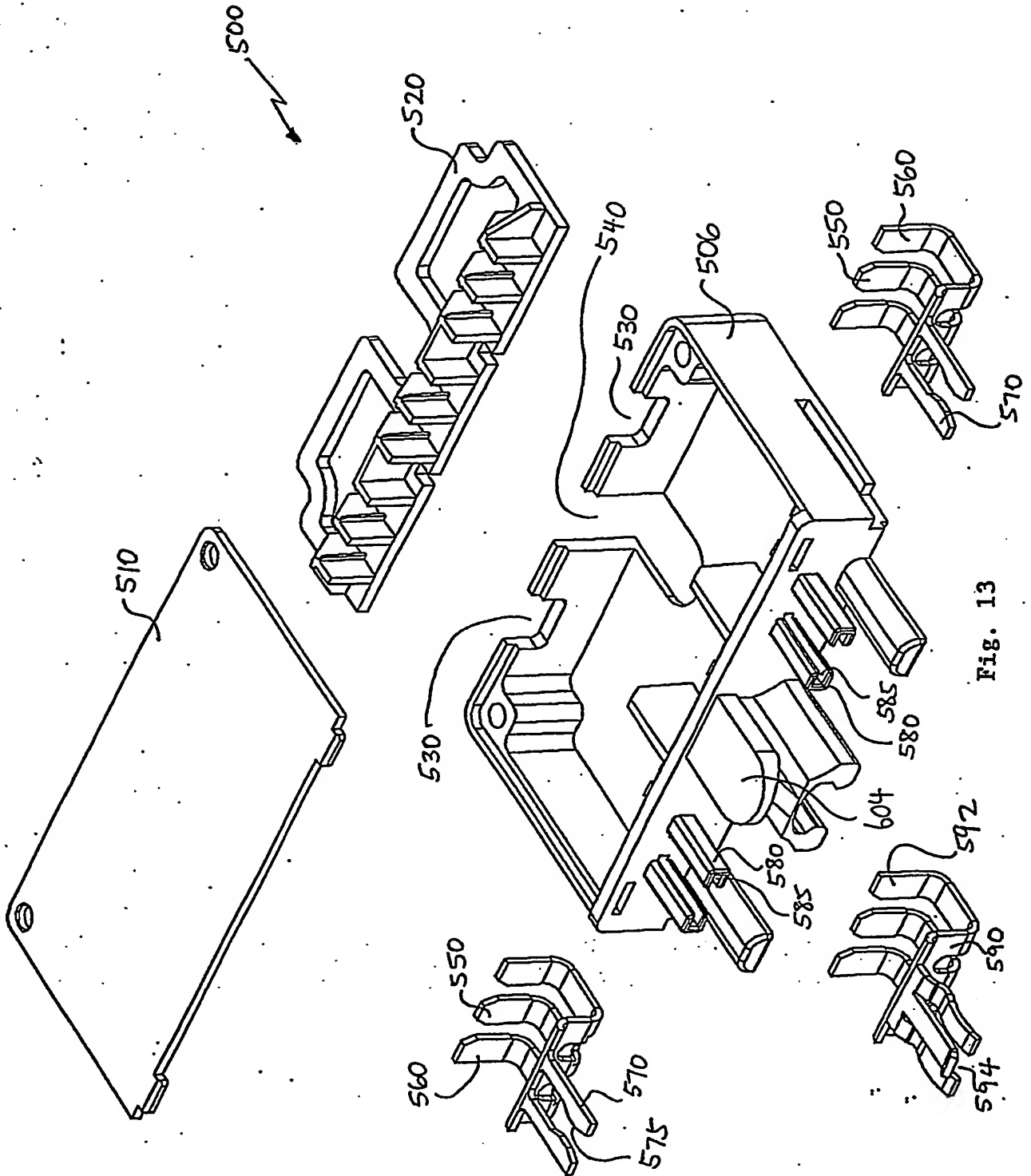
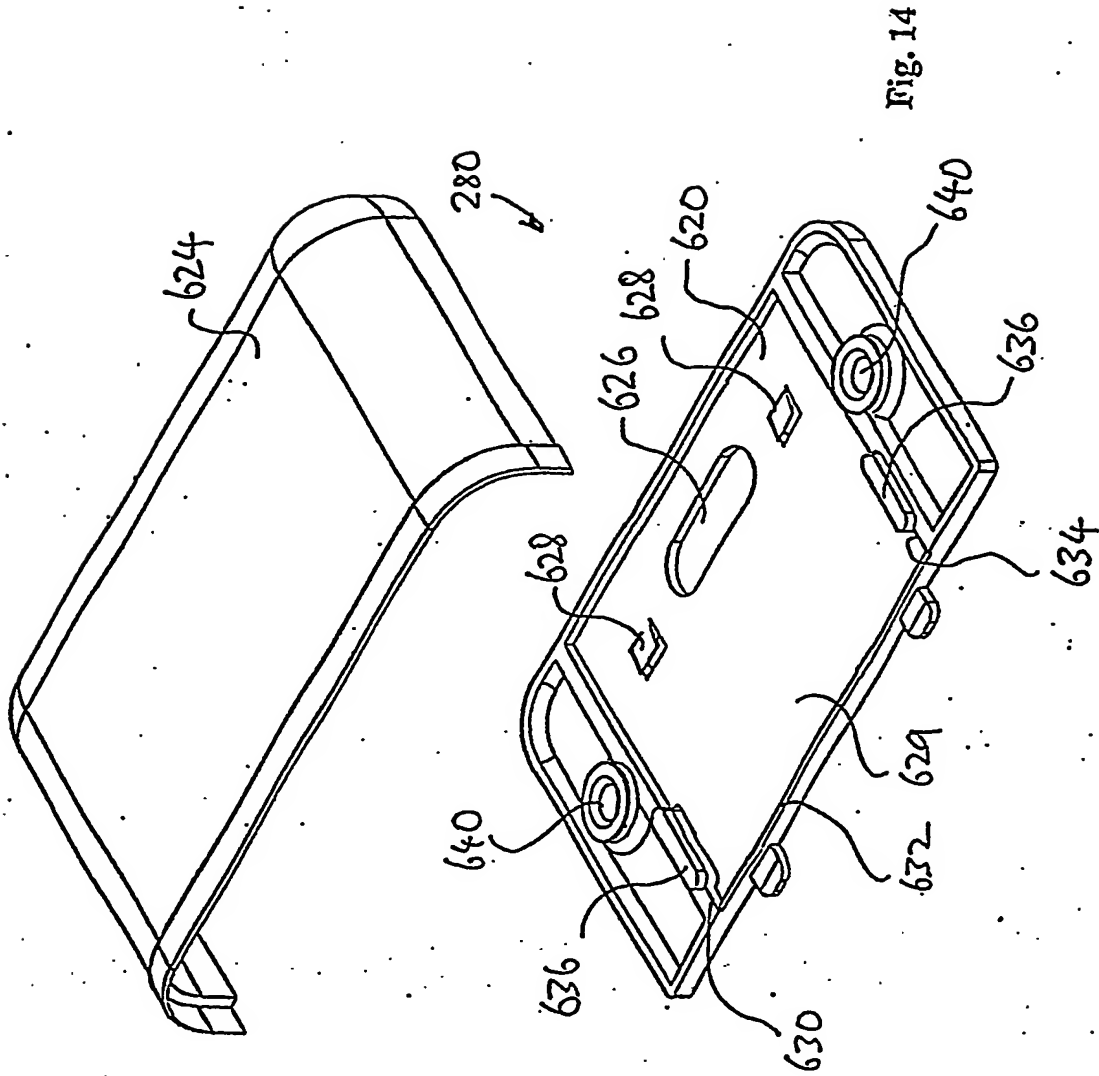


Fig. 13



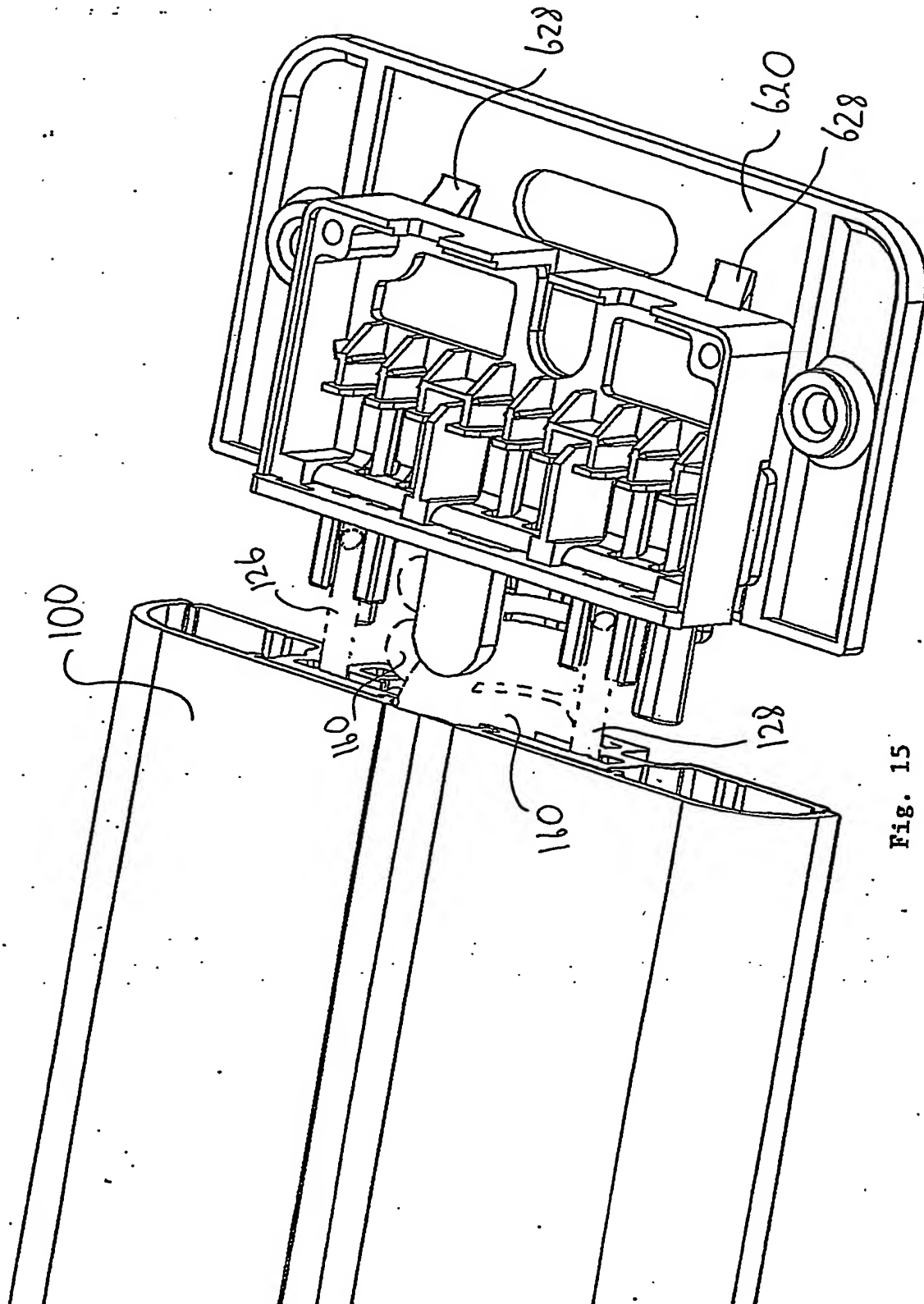


Fig. 15

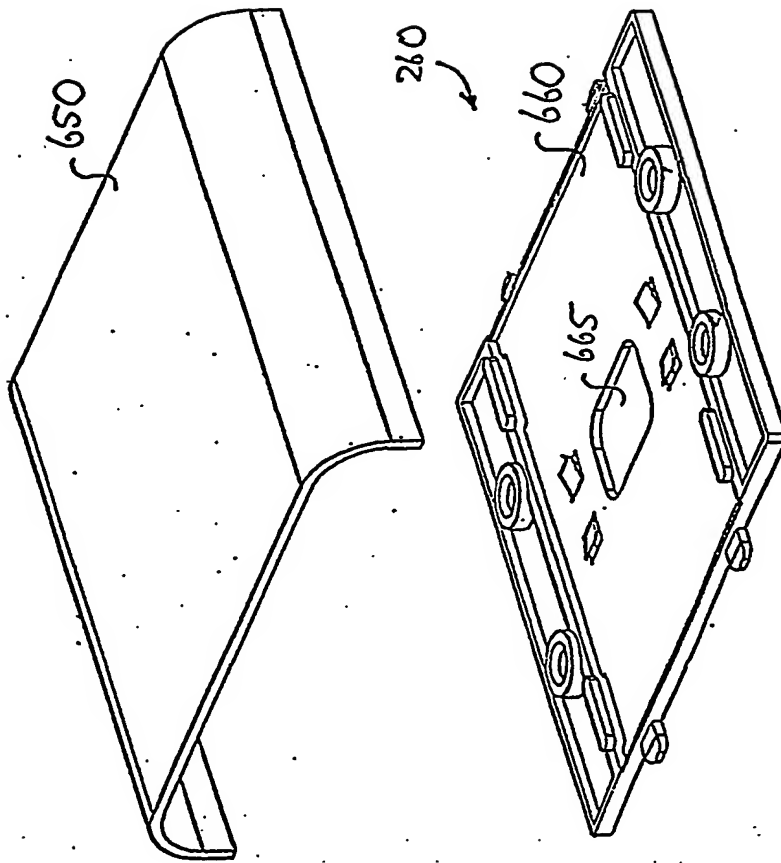


Fig. 16

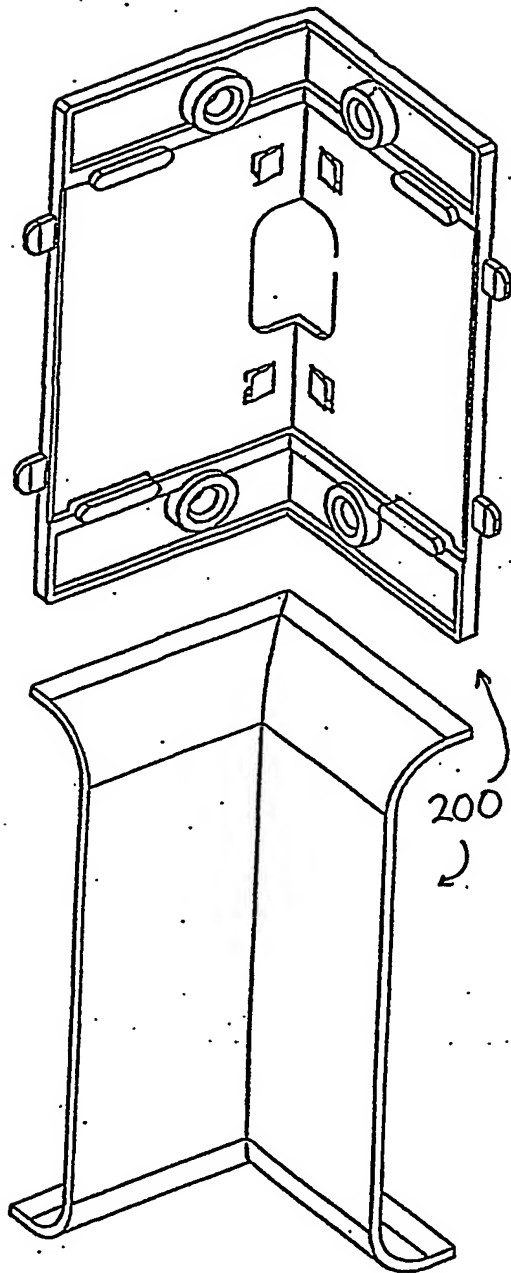


Fig. 17

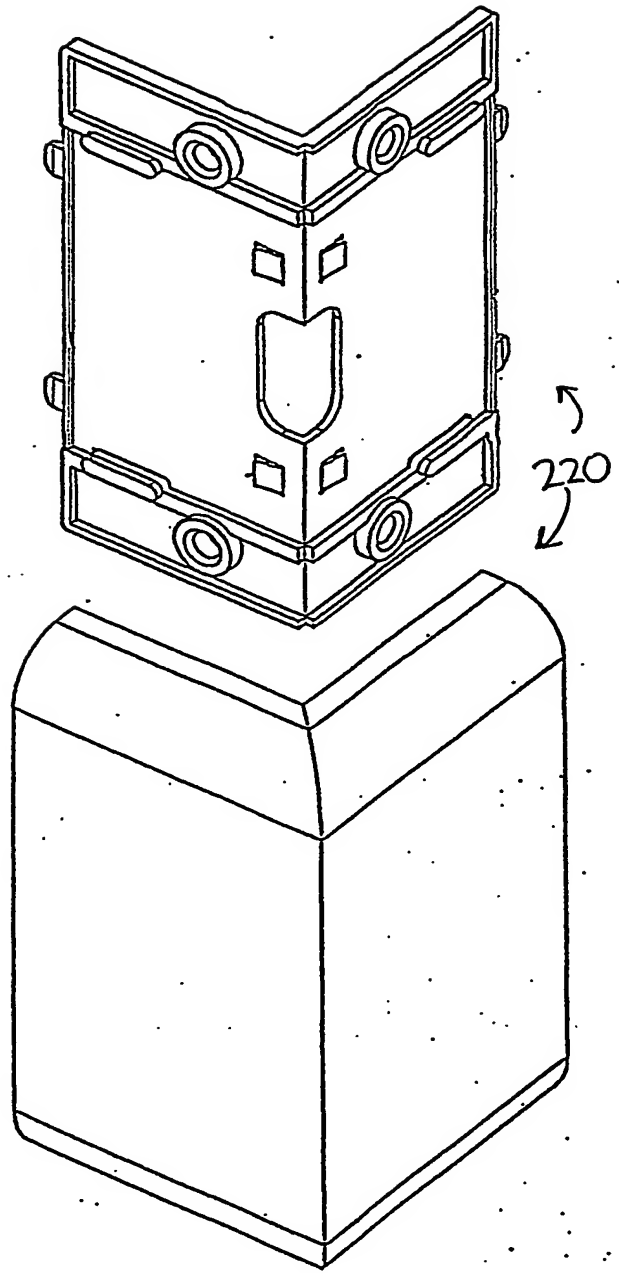


Fig. 18

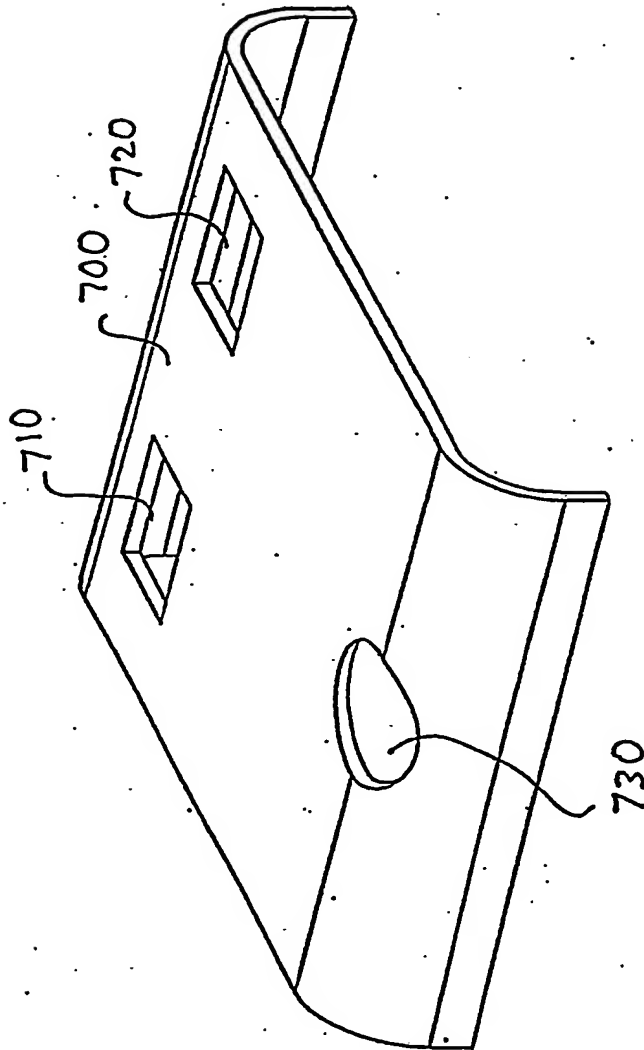


Fig. 19

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